IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No.	:	10/802,625
Applicant	:	Slaughter and Olson
Filed	:	March 17, 2004
Title	:	Parallel Seismic Depth Testing Using a Cone Penetrometer
Group Art Unit	:	2856
Examiner	:	C. Garber
Docket No.	:	001.104

Declaration Under 37 C.F.R. 1.132

Parish of East Baton Rouge

State of Louisiana

Affiant, Scott H. Slaughter states as follows:

Affidavit of Scott H. Slaughter

I, Scott H. Slaughter, being duly deposed and sworn, hereby state:

1) That, I am a Registered Professional Geotechnical Engineer with over 15 years of foundation design experience for many type projects including bridges, buildings and roadways.

2) That, I have over 10 years experience using various non destructive testing techniques for the evaluation of the integrity, capacity and unknown depths of deep foundation systems.

3) That, I am an inventor in the above-identified patent application.

4) That, the invention is a method of determining the pile or shaft depths of existing foundation systems where the shaft depth is unknown. This could be due to missing or incomplete records from the original construction.

5) That, deep foundation construction involves the installation of a pile or shaft of a specified length. This length is not arbitrary and is usually determined by the geotechnical engineer who designed the foundation system from an evaluation of the subsurface conditions (soils), pile or shaft type, the pile hammer system, and the foundation loading requirements.

6) That, to account for variations in subsurface stratigraphy and the effectiveness of driving operations, detailed records are maintained throughout the pile installation process. The driving resistance (blow count) versus driven depth are recorded which is used by the geotechnical engineer to verify the pile will perform as desired and has achieved the desired capacity to support foundation loadings.

7) That, I have reviewed the Office Action relating to the above-identified patent application and mailed February 14, 2006, and the references (Mercado 5,996,414, House 4,365,306, and Baziw 5,177,709) relied upon in this Office Action.

8) That, contrary to the Examiner's statement that whether the shaft is preexisting "does not appear to have any effect or limitation on the method or process of measuring the shaft depth" in fact, the depth of piles being driven is determined by physically measuring the pile while it is being driven, customarily by monitoring markings on the pile being driven. For example, the pile might be marked off in 1 foot increments, starting from the driven end of the pile. The inspector then reads the mark at ground level to determine the driven depth. Refer to Attachment A, which includes two photographs of piles showing depth markings. Photograph 1 shows a pile before driving is begun, and Photograph 2 shows a pile being driven. Also refer to Attachment B, which is a document provided by the U.S. Department of Transportation (FHWA), providing instructions to inspectors on how to determine when to stop driving a pile (called Pile Acceptance). Note that each illustration of a driven pile shows the depth markings on the pile.

9) That, in no case known to affiant is the depth of a pile being driven measured by any sort of remote means. Nor would such a method be acceptable to the site inspector. Refer again to Attachment B, the Pile Acceptance document for inspectors. The Section entitled "Length Driven" describes how to determine the driven depth for vertical and battered (tilted) piles. In each case, the Inspector personally reads the depth markings on the pile and performs calculations as described. Refer to Attachment C, which are representative Pile Driving Records from the Alabama and Wisconsin Departments of Transportation that demonstrate the type information collected by the Inspector during pile installation, including the driven depth.

10) That, the "blows per distance driven" is monitored in order to know when a pile has been driven as far as it reasonably can be driven, and not to determine the depth of the pile. Refer to Attachment B, "Have You Reached Practical Refusal?" which includes one definition of "practical refusal" (the point at which it doesn't make sense to continue driving the pile because, for example, the pile has hit bedrock) as 20 blows/inch or more.

11) That, the House reference is directed to remotely monitoring and evaluating the rate at which a pile driving hammer strikes a pile for providing a permanent record of the monitored information. This blow rate can be determined either during a predetermined time period or during a selectable distance of pile movement. The House invention cannot measure the driven depth of the pile.

12) That, therefore the combination of the Mercado reference and the House reference does not reasonably teach measuring the depth of a preexisting shaft using cone penetrometry. There is no suggestion in the art that the two references be combined, and if they were combined they would not result in a device that would accomplish this.

All statements made in the foregoing Affidavit which are from the Affiant's own knowledge are true and all statements made on information and belief are believed to be true.

Further Affiant sayeth not.

Subscribed and sworn to before me this 26th Day of May, 2006

Notary Public

My Commission Expires _____

MELVA CAVANAUGH
NOTARY PUBLIC NO. 8975
STATE OF LOUISIANA
PARISH OF EAST BATON ROUGE
My Commission is for Life

Respectfully Submitted,

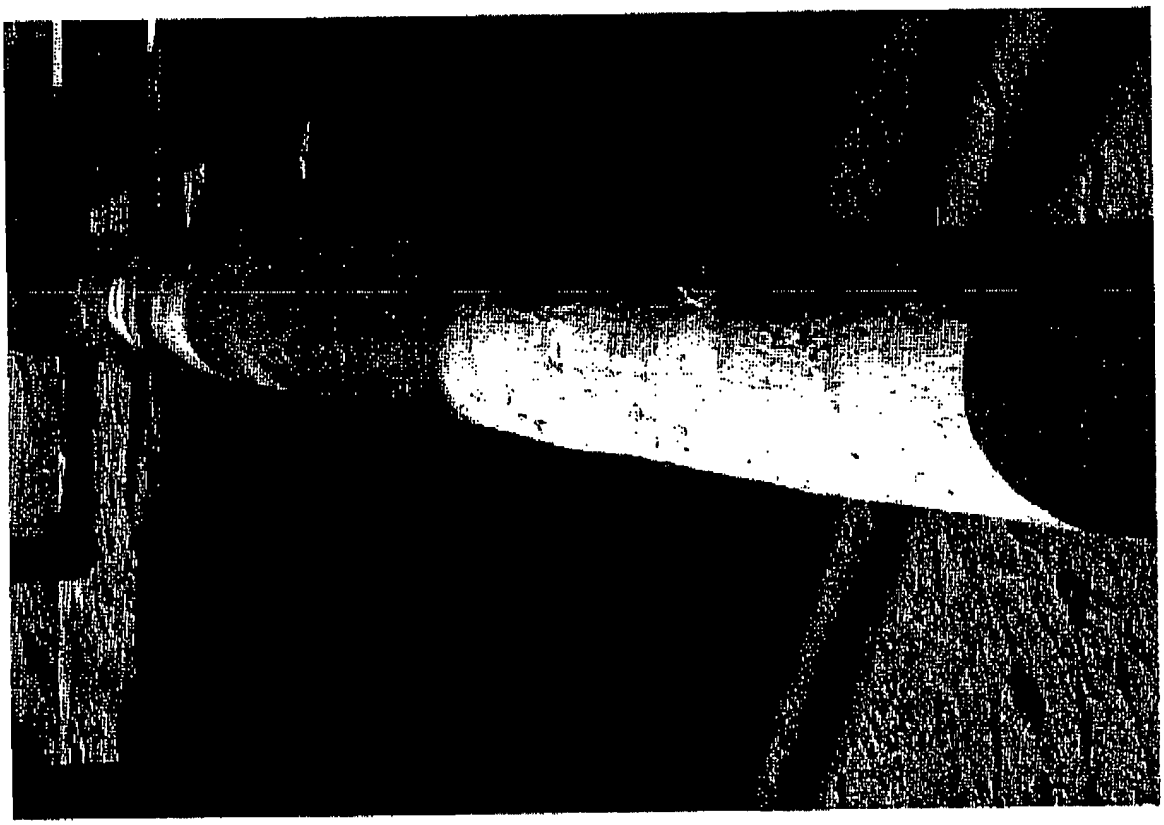
By
Scott H. Slaughter

Dated May 26, 2006

ATTACHMENT A

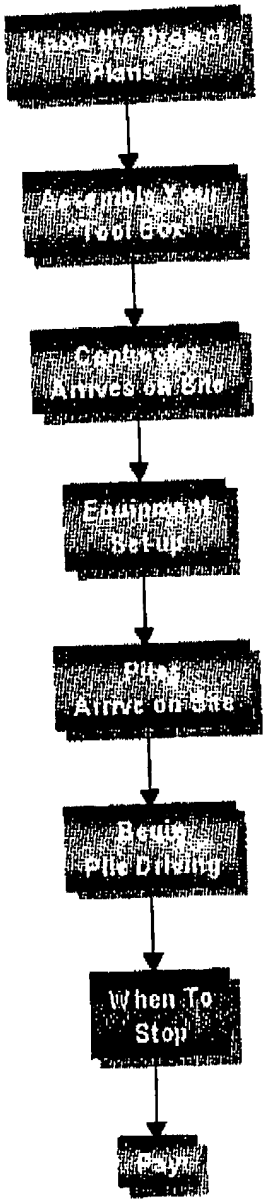
2 photographs on 1 page

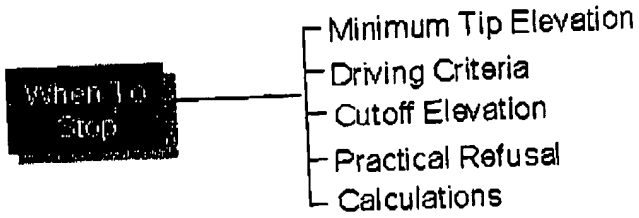

30 ft
25 ft
20 ft
15 ft



ATTACHMENT B

10 pages Federal Highway Administration

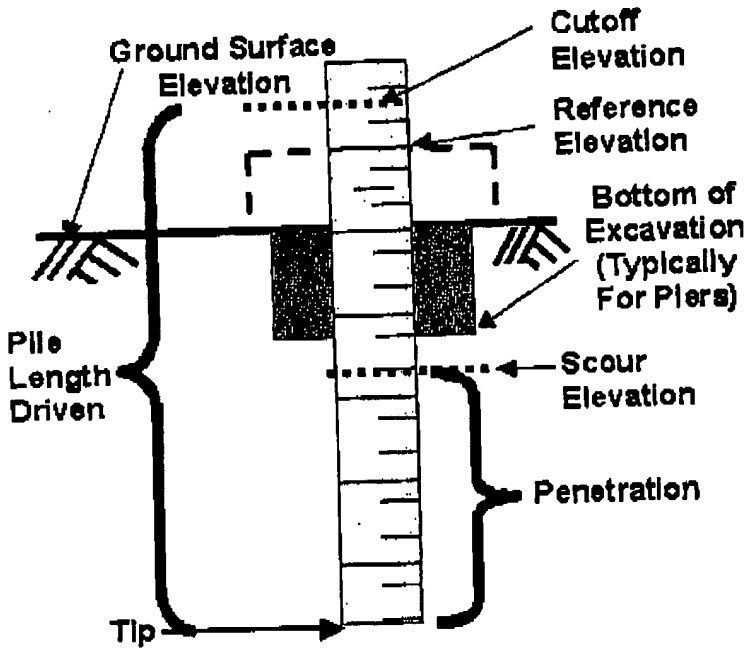




When to Stop

Knowing "When To Stop" driving is one of the most important responsibilities the Inspector has. Depending upon the situation, this decision has numerous ramifications, such as extra Contractor pay, damaging the pile, etc., so it is imperative the Inspector know and understand the When To Stop Driving or Pile Acceptance decision process.

First, let's review some of the terms and definitions the Inspector needs to understand.



Ground Surface Elevation- The elevation of the existing ground surface.

Cutoff Elevation- This is the specified finish elevation for the top of the pile.

Pile Length Driven- The length of pile between the Cutoff Elevation and the Tip Elevation.

Tip (Tip Elevation)- The elevation of the bottom (tip) of the pile.

Penetration- The length of pile below the lowest of three elevations; Ground Surface: Bottom of Excavation; Scour Elevation.

Scour Elevation- a specified elevation representing the depth of potential scour, which is the action of soil being removed by water movement.

Reference Elevation- This is a fixed point and elevation on the template, string line or other stationary object, used to observe the increment marks on the pile relative to the reference point (reference elevation).

Bottom of Excavation- the elevation of the bottom of an excavation (i.e. footing).

There are several points at which the Inspector needs to make this decision of when to stop driving, those being:

1. If there is a specified Minimum Tip Elevation, has the pile achieved it?
2. If no Minimum Tip Elevation is specified, have you reached the Minimum Penetration Requirements?
3. Has the specified Driving Criteria been achieved?
4. Has Practical Refusal been reached?
5. Is the Pile within 2 feet of the specified Cut-off elevation?

The Inspector has the responsibility to tell the Contractor when to stop driving due to achieving one of the above conditions. Naturally, the Inspector may also ask the Contractor to stop driving when they suspect the Contractor's equipment or operations are outside the specifications.

Acceptance Determination

The Engineer may accept a driven pile when the pile has achieved minimum penetration, the blow count is generally increasing and the minimum required bearing capacity obtained for 24 inches [600 mm] of consecutive driving. At the Engineer's discretion, a driven pile may be accepted when the minimum penetration is achieved and driving has reached practical refusal in firm material.

Has the Pile Reached Minimum Tip Elevation?

When a Minimum Tip Elevation is specified in the Contract Documents or Driving Criteria Letter, this is the elevation or depth that the tip pile must be driven to as a minimum. Based upon results of the Test Pile program, the designer determined that the piles must achieve this amount of penetration to obtain the design capacity.

More specifically, *Penetration Requirements ...".When the Contract Documents show a minimum pile tip elevation or a minimum depth of penetration, drive the tip of the pile to this minimum elevation or this minimum penetration depth. In all such cases, the Engineer will accept the bearing capacity of a pile only if the Contractor achieves the required bearing value when the tip of the pile is at or below the specified minimum tip elevation or depth of penetration..."*

Next we will review how to calculate "Tip Elevation" for plumb and battered piles.

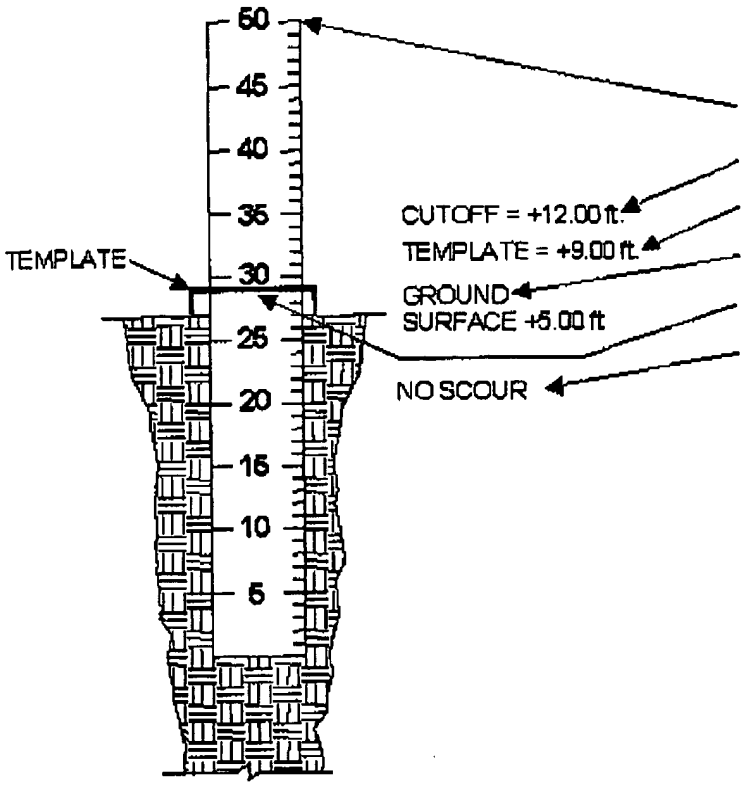
Calculation for Determining Tip Elevation

For Vertical Pile (Illustration to the below)

Tip Elevation = Reference Elev. - Length Below Reference

Using the illustration below, we know the following:

3



Therefore:

TIP ELEVATION= +9.00' – 29.00')

TIP ELEVATION= -20.00'

It is important to remember to use the + and – signs for elevations during your calculations. If an answer is a minus elevation and the – (minus sign) does not appear, the elevation is then assumed to be a + (plus sign).

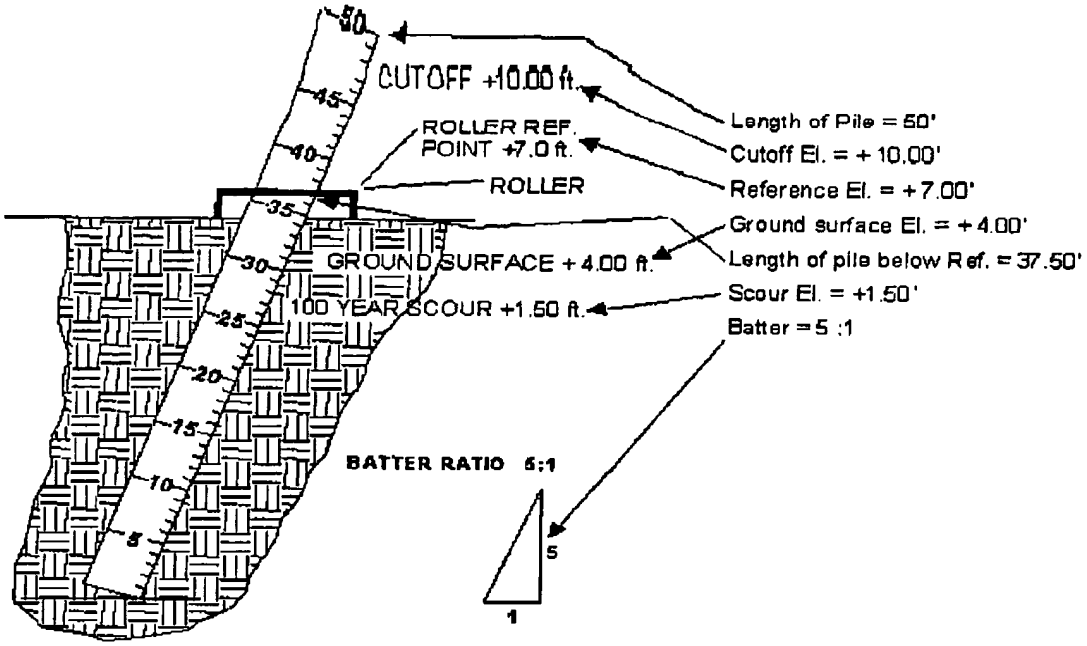
Battered Pile

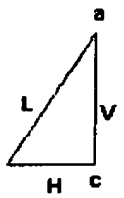
For battered piles the calculation is essentially the same except you must use a Correction Factor to compensate for the batter.

Tip Elev. = Reference Elev. - [Length below Ref. Elev. X Correction Factor]

Using the illustration below and the information on the next page we know:

4





Batter Ratio = V/H or V:H

Definitions:

L = Pile Length Below Reference Point (ft)
a = Reference Point Elevation (ft)
V = Corrected Pile Depth (ft)
C = Pile Tip Elevation (ft)

Batter Ratio (V:H)	Correction Factor (R)
12:1	0.997
10:1	0.995
12:2 (6:1)	0.986
10:2 (5:1)	0.981
12:3 (4:1)	0.971
10:3	0.958
12:4 (3:1)	0.949
10:4 (5:2)	0.928
12:5	0.923

Formulas:

V = L*R
c = a - W

Therefore:

Don't forget to use the + & - signs for elevations. Also always do the work in the brackets () or [] before doing the calculation

Tip El. = TE
Ref. El. = +7.00'
Length Below Ref. = 37.5' Correction Factor = .981 (from table right)

TE = + 7.00' - [37.5' X .981] (Do the calculation in the [] prior to subtracting from +7.00')